

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

REC'D 18 APR 2006

**PCT** WIPO PCT

To:  
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## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Applicant's or agent's file reference <b>010-0011</b>		Date of mailing (day/month/year) <b>13 APR 2006</b>	
International application No. <b>PCT/US05/08298</b>		FOR FURTHER ACTION See paragraph 2 below	
International filing date (day/month/year) <b>11 March 2005 (11.03.2005)</b>	Priority date (day/month/year) <b>13 March 2004 (13.03.2004)</b>		
International Patent Classification (IPC) or both national classification and IPC <b>IPC: G06F 15/173( 2006.01) G06F 15/167( 2006.01),9/46( 2006.01)</b> <b>USPC: 709/224,226,217;719/318</b>			
Applicant <b>CLUSTER RESOURCES, INC.</b>			

**1. This opinion contains indications relating to the following items:**

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.  
For further options, see Form PCT/ISA/220.

**3. For further details, see notes to Form PCT/ISA/220.**

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Date of completion of this opinion <b>03 April 2006 (03.04.2006)</b>	Authorized officer <i>John Follansbee</i> John Follansbee Telephone No. 703-305-3900
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Form PCT/ISA/237 (cover sheet) (April 2005)

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Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed  
☐ a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing  
☐ table(s) related to the sequence listing

b. format of material

- ☐ on paper  
☐ in electronic form

c. time of filing/furnishing

- ☐ contained in the international application as filed.  
☐ filed together with the international application in electronic form.  
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

Claims 7, 20 YES

Claims 1-6, 8-19, 21-47 NO

Inventive step (IS)

Claims NONE YES

Claims 1-47 NO

Industrial applicability (IA)

Claims 1-47 YES

Claims NONE NO

2. Citations and explanations:

Please See Continuation Sheet

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Supplemental Box  
In case the space in any of the preceding boxes is not sufficient.

**V. 2. Citations and Explanations:**

Claims 1-47 meet the criteria set out in PCT Article 33(4), and thus contain industrial applicability because the subject matter claimed can be made or used in industry.

Claims 1-6, 8-19, 21-47 lack novelty under PCT Article 33(2) as being anticipated by Earl US 2003/0233446 A1, Dec 18, 2003 (Hereinafter Earl).

As per claim 1, Earl teaches a method of dynamically modifying resources within a compute environment (e.g., figure 1, abstract, paragraphs 5, 6), the method comprising: receiving a request for resources in the compute environment (e.g., figures 1-4, paragraphs 28-29); monitoring events after receiving the request for resources (e.g., figures 1-4, paragraphs 60-62) and based on the monitored events dynamically modifying at least one of the request for resources and the compute environment (e.g., figure 8, paragraph 90). As per claim 2, Earl teaches the compute environment is one of a compute farm, a cluster environment and a grid environment (e.g., figure 1, paragraph 25).

As per claim 3, Earl teaches the request for resources is a request for consumption resources (e.g., figure 2, paragraph 76). As per claim 4, Earl teaches the request for resources is a request for provisioning services (e.g., figure 2, paragraph 76).

As per claim 5, Earl discloses the request for resources is a request to process a batch job (e.g., figures 1, 4, paragraph 28).

As per claim 6, Earl discloses the request for resources is a request for direct volume access (e.g., figures 1, 4, paragraph 28).

As per claim 8, Earl discloses monitoring events after receiving the request for resources further comprises monitoring the compute environment (e.g., figures 3, paragraph 34).

As per claim 9, Earl discloses monitoring events after receiving the request for resources further comprises monitoring to determine if a party submitting the request has submitted a job for processing once resources in the compute environment are reserved for the job (e.g., figures 1, 4, paragraph 40).

As per claim 10, Earl discloses if the party submitting the request for resources has not submitted a job for processing after a predetermined amount of time, then dynamically modifying the request for resources further comprises canceling the request for resources (e.g., figures 1, 4, paragraph 40).

As per claim 11, Earl discloses a job comprises one of a reservation, an object that monitors policy, an object that monitors credentials, an object that monitors node states and an object that monitors the compute environment (e.g., figures 1, 4, paragraph 44).

As per claim 12, Earl discloses based on the monitored events in the compute environment, modifying the compute environment further comprises dynamically modifying the compute environment to satisfy the request for resources (e.g., figures 1, 4, paragraph 52).

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**Supplemental Box**

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As per claim 13, Earl discloses dynamically, modifying the compute environment further comprises at least one of: modifying at least one node, modifying at least one operating system, installing end user applications, dynamically partitioning node resources and adjusting network configuration (e.g., figures 1, 4, paragraph 60).

As per claim 14, Earl discloses the request for resources is a request for a reservation of resources in the compute environment (e.g., figures 1, 4, paragraph 58).

As per claim 15, Earl discloses monitoring events after receiving the request for a reservation further comprises monitoring compute resources associated with the reservation (e.g., figures 1, 4, paragraph 76).

As per claim 16, Earl discloses dynamically modifying the compute environment to more adequately process jobs submitted within the reservation (e.g., figures 1, 4, paragraph 79).

As per claim 17, Earl discloses modifying the request for resources comprises migrating a reservation to be associated with new resources. (e.g., figures 1, 4, paragraph 80).

As per claim 18, Earl discloses migrating the reservation is one of a migration in space and a migration in time to the new resources (e.g., figures 1, 4, paragraph 84).

As per claim 19, Earl discloses the new resources better meet needs associated with the request for resources (e.g., figures 1, 4, paragraph 84).

As per claim 21, Earl discloses wherein the migration in time seeks to create a reservation based on availability of resources in the compute environment (e.g., figures 1, 4, paragraph 86).

As per claim 22, Earl discloses wherein the migration in space comprises migrating the reservation to resources that will provide better performance of the compute environment for the request for resources (e.g., figures 1, 4, paragraph 78).

As per claim 23, Earl discloses the migration in space comprises migrating the reservation to resources according to a failure or projected failure of resources (e.g., figures 1, 4, paragraph 29).

As per claim 24, Earl discloses monitoring events after receiving the request for resources further comprises monitoring a job submitted within a reservation based on the request (e.g., figures 1, 4, paragraph 29).

As per claim 25, Earl discloses if the job submitted within the reservation will extend beyond the reservation, the method further comprises canceling the job (e.g., figures 1, 4, paragraph 30).

As per claim 26, Earl discloses prior to canceling the job, the method further comprises presenting to the entity that submitted the job an option of extending the reservation to accommodate the job (e.g., figures 1, 4, paragraph 34).

As per claim 27, Earl discloses the option of extending the reservation to accommodate the job is subject to pre established policies (e.g., figures 1, 4, paragraph 52).

As per claim 28, Earl discloses presenting to the entity, with the option of extending the reservation, a pricing option to extend the reservation (e.g., figures 1, 4, paragraph 48).

As per claim 29, Earl discloses the request for resources in a compute environment comprises a reservation of resources for a window of time in which at least one user can submit personal reservations (e.g., figures 1, 4, paragraph 48).

As per claim 30, Earl discloses personal reservations are one of a non administrator reservation and an administrator reservation (e.g., figures 1, 4, paragraph 56).

As per claim 31, Earl discloses the reservation of compute resources for a window of time is a request for cluster resources for a periodic window of time (e.g., figures 1, 4, paragraph 49).

As per claim 32, Earl discloses the periodic window of time may be daily, weekly, monthly, quarterly or yearly (e.g., figures 1, 4, paragraph 49).

As per claim 33, Earl discloses receiving a personal reservation for the use of compute resources within the window of time; and providing access to the reserved compute resources for the personal reservation to process jobs (e.g., figures 1, 4, paragraph 52).

As per claim 34, Earl discloses if a received consumption job associated with the personal reservation will exceed the window of time for the reservation of compute resources, then the method comprises canceling and locking out the personal reservation from access to the compute resources (e.g., figures 1, 4, paragraph 60).

As per claim 35, Earl discloses if a received consumption job associated with the personal reservation will exceed the window of time, then the method comprises never starting the consumption job (e.g., figures 1, 4, paragraph 60).

As per claim 36, Earl discloses before canceling and locking out the personal reservation, the step of presenting to a user who submitted the personal reservation an option of allowing the jobs running within the personal reservation to complete although it is beyond the window of time for their reservation of compute resources (e.g., figures 1, 4, paragraph 76).

As per claim 37, Earl discloses if the job submitted under a personal reservation would exceed the personal reservation, extending the personal reservation to meet the needs of the job (e.g., figures 1, 4, paragraph 76).

As per claim 38, Earl discloses a method of managing resources within a compute environment (e.g., figure 1, abstract, paragraphs 5, 6), the method comprising: receiving a request for resources in the compute environment (e.g., figures 1-4, paragraphs 28-29); reserving resources in the compute environment according to the request (e.g., figures 1-4, paragraphs 60-62); and charging the requestor based on the reservation of resources (e.g., figure 8, paragraph 90).

As per claim 39, Earl discloses charging the requestor further comprises charging a specific rate for the reserved resources whether the reserved resources are used or not (e.g., figures 1-4, paragraphs 60-62).

As per claim 40, Earl discloses charging the requestor further comprises charging a first rate for reserved resources that are used and a second rate for reserved resources that are not used (e.g., figures 1-4, paragraphs 60-62).

As per claim 41, Earl discloses a used resources is consumed by a job run within the reservation (e.g., figures 1-4, paragraphs 28-29).

As per claim 42, Earl discloses creating a reservation for resources within the compute environment based on the request for resource; and dynamically customizing resources within the reservation to meet workload submitted within the reservation (e.g., figure 1, abstract, paragraphs 5, 6).

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**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

As per claim 43, Earl discloses the reservation is associated with one of an individual or a group (e.g., figure 1, abstract, paragraphs 5, 6). As per claim 44, Earl discloses a computer readable medium storing instructions for controlling a computing device to dynamically manage resources within a compute environment (e.g., figure 1, abstract, paragraphs 5, 6), the instructions comprising: receiving a request for resources in the compute environment (e.g., figures 1-4, paragraphs 60-62); monitoring events after receiving the request for resources (e.g., figures 1-4, paragraphs 28-29); and based on the monitored events, dynamically modifying at least one of the request for resources and the compute environment (e.g., figure 8, paragraph 90).

As per claim 45, Earl discloses a system for dynamically managing resources within a compute environment (e.g., figure 1, abstract, paragraphs 5, 6), the system comprising: means for receiving a request for resources in the compute environment (e.g., figures 1-4, paragraphs 28-29); means for monitoring events after receiving the request for resources (e.g., figures 1-4, paragraphs 60-62); and based on the monitored events, means for dynamically modifying at least one of the request for resources and the compute environment (e.g., figure 8, paragraph 90).

As per claim 46, Earl discloses a system for dynamically managing resources within a compute environment (e.g., figure 1, abstract, paragraphs 5, 6), the system comprising: a module configured to receive a request for resources in the compute environment (e.g., figures 1-4, paragraphs 28-29); a module configured to monitor events after receiving the request for resources (e.g., figures 1-4, paragraphs 60-62); and a module configured to dynamically modify at least one of the request for resources and the compute environment based on the monitored events (e.g., figure 8, paragraph 90).

As per claim 47, Earl discloses a compute environment comprising a plurality of computing devices (e.g., figure 1, abstract, paragraphs 5, 6), the compute environment having resources which are dynamically managed according to a method comprising: receiving a request for resources in the compute (e.g., figures 1-4, paragraphs 28-29); monitoring events after receiving the request for resources (e.g., figures 1-4, paragraphs 60-62); and based on the monitored events, dynamically modifying at least one of the request for resources and the compute environment (e.g., figure 8, paragraph 90).

As per claims 7 and 20, Earl teaches the invention as disclosed above. However, Earl does not teach virtual private cluster and reservation at earliest time possible. Attanasio discloses these limitations (e.g., figures 1-4, col., 2, lines 7 - 37). It would be obvious to one of ordinary skilled in the art at the time of invention to include these limitations with the teachings of Earl in order to utilize virtual private cluster and having a reservation at the earliest time available. The reservation at earliest time available would provide reserving earliest time for migration and the virtual private cluster would enhance supporting dynamic assignment of resources in the compute environment.